

Invertebrate herbivory of the Soft Tree-fern *Dicksonia antarctica*

There are few studies detailing the invertebrates found on the Soft Tree-fern *Dicksonia antarctica*, particularly in Australia. This Naturalist Note reports on observations made from Soft Tree-ferns growing at Baw Baw National Park in a Cool Temperate Rainforest pocket along the Mt Erica Road.

Observations were made on 18 April 2005 from about 11 a.m. to 2 p.m. on a clear day. A 30 m buffer zone from the road was allowed so that any possible edge effects were minimised. Every Soft Tree-fern along a 45 m transect running parallel to a small stream was carefully examined for the presence of any invertebrates on the fronds and for any sign of damage on the fronds. Damage was designated three levels: low – where only tips of secondary pinnae were damaged; moderate – where signs of damage occurred anywhere along the length of secondary pinnae; high – where only the rachis of the frond and the mid veins of primary pinnae remained.

The trunk height of each Soft Tree-fern was measured, number of fronds counted and each frond designated a level of damage. Whether or not Soft Tree-ferns were in an ‘open’ or ‘closed’ habitat was noted. An ‘open’ habitat meant that the tree-fern did not have other trees, debris or boulders beside it, i.e. one could walk around it unhindered. A ‘closed’ habitat meant that one could not walk unobstructed around the trunk. Finally, leaf litter accumulation within the depression formed at the top of the trunk by the emergence of the fronds

was measured. Invertebrates often live within litter but move from it to feed, thus it was thought that if more litter was present, more invertebrates might occur.

Seventeen Soft Tree-ferns were examined. All exhibited herbivory by invertebrates. Twelve invertebrate species were identified (Table 1). All were herbivorous except the trapdoor spider and ants. Seven were chompers, two were stem borers and one was a sap sucker (Table 1). The trapdoor spider was carnivorous while the ants ‘farmed’ the treehoppers, feeding on the sugary substance they secreted. The trapdoor spider and snail were found on the trunk of one of the tree-ferns, the Darkling Beetle within the litter, and all other species on the fronds.

Tree-ferns ranged from 45 to 190 cm with a mean height of 105 cm. The number of fronds ranged from 7 to 28 with a mean of 16. There was a positive correlation between height and the number of fronds (Fig. 1) ($r = 0.77$, $df = 16$, $p < 0.01$). There also was a significant correlation between tree-fern height and the degree of frond damage (Fig. 2) ($F_{2,31} = 7.83$, $p = 0.002$). A *Post hoc* test showed that taller Soft Tree-ferns had lower levels of damage than shorter Soft Tree-ferns. This was not related to the number of invertebrate species per tree. Similarly, there was no significant difference between the number of fronds on a tree-fern and the degree of frond damage ($F_{2,31} = 1.36$, $p = 0.27$) although trees with fewer fronds tended to have higher levels of damage (Fig. 3). This

Table 1. Invertebrates on the Soft Tree-fern

Common name	Order	Family	Feeding strategy
Bug Nymph	<i>Hemiptera</i>	<i>Acanthosomatidae</i>	Chewing
Crane Fly	<i>Diptera</i>	<i>Tipulidae</i>	Chewing
Darkling Beetle	<i>Coleoptera</i>	<i>Tenebrionidae</i>	Chewing
Psyllid	<i>Hemiptera</i>	<i>Psyllidae</i>	Chewing
Treehopper	<i>Hemiptera</i>	<i>Membracidae</i>	Sapsucking
Weevil (sp. 1)	<i>Coleoptera</i>	<i>Curculionidae</i>	Stem-boring
Weevil (sp. 2)	<i>Coleoptera</i>	<i>Curculionidae</i>	Stem-boring
Snail	Class: <i>Gastropoda</i>	?	Chewing
Slug	Class: <i>Gastropoda</i>	?	Chewing
Caterpillar	?	?	Chewing
Ants	<i>Hymenoptera</i>	?	Farm treehoppers
Trapdoor Spider	<i>Arachnidae</i>	<i>Nemesiidae</i>	Insectivorous

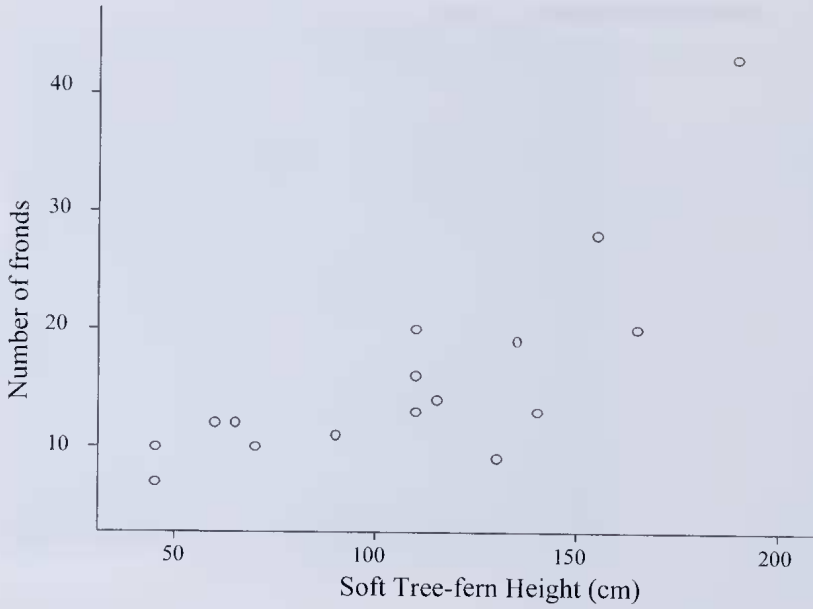


Fig. 1. Comparison of Soft Tree-fern height with the number of fronds.

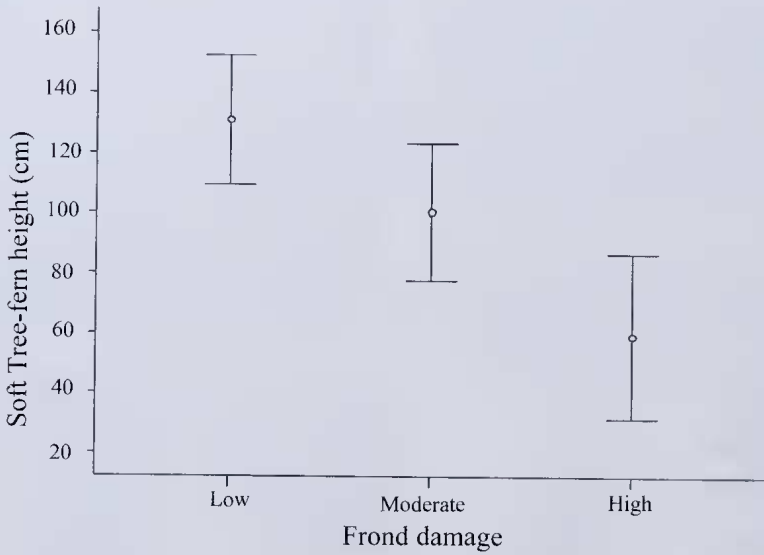


Fig. 2. Variation in frond damage with Tree-fern height

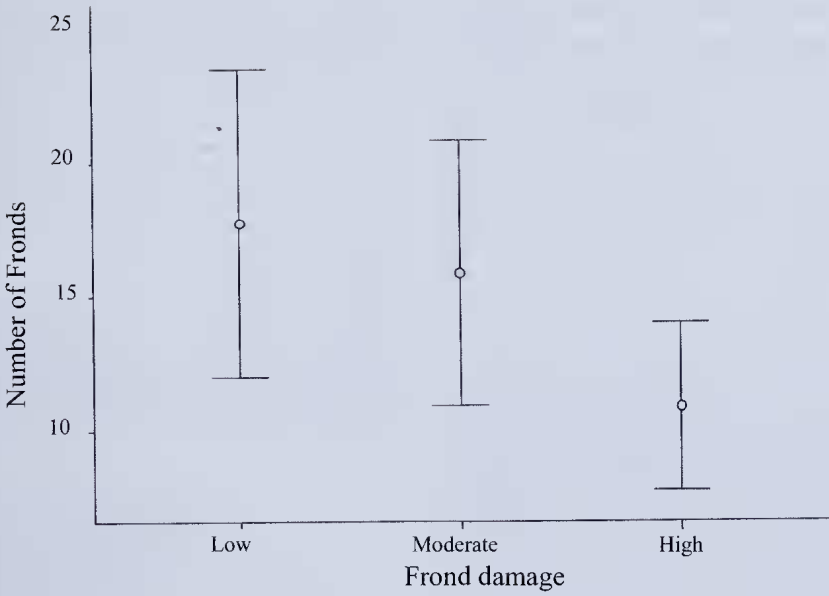


Fig. 3. Comparison of the number of fronds per tree with degree of damage.

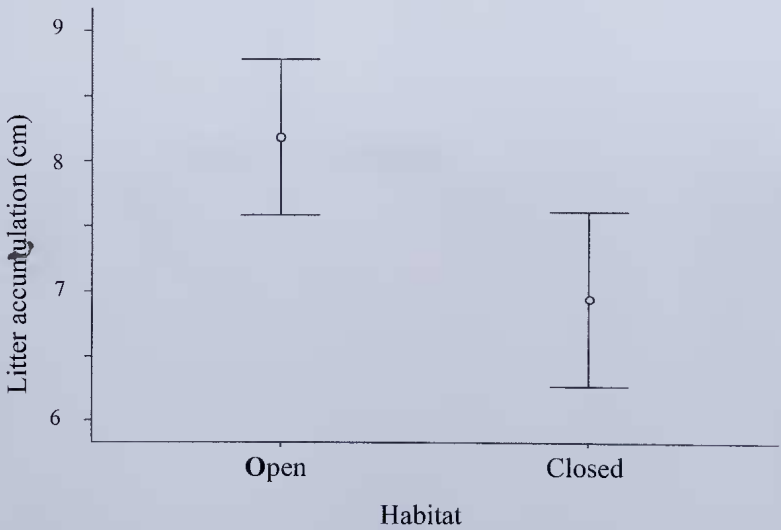


Fig. 4. Variation in litter accumulation at the base of fronds with habitat type.

is understandable as trees with fewer fronds were shorter than trees with higher numbers of fronds. There was no significant difference between the number of invertebrates and the degree of frond damage ($F_{2,31} = 0.63$, $p = 0.54$). Shorter trees are more accessible to ground dwelling invertebrates, possibly explaining why they could show higher levels of damage than taller trees in spite of there not being a significant correlation with number of invertebrates.

Ferns in an 'open' habitat had significantly higher amounts of leaf litter in the depression caused by emergence of fronds from the trunk than ferns in 'closed' habitats (Fig. 4). Litter depth within the depression caused by emergence of the fronds from the trunk ranged from 2 to 11 cm but there was no significant correlation between the number of invertebrate species and litter depth. Neither was there a significant difference between fern habit and the number of invertebrates recorded.

Conclusion

Observations for this note were taken over a three hour period on a single day. It often is perceived that ferns are not particularly

edible but the extent of damage to some fronds, i.e. only stalks left, shows that this is not the case. Whether or not this was caused by the types of invertebrates found is unknown and would require further study. However, it is amazing how much information can be gleaned over such a short time period. Hopefully this note encourages others to look more closely when they wander out into the bush, and to publish their short term observations.

Acknowledgements

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**Dustin Lehr, Jo North
and Michelle Cathie**

School of Life and Environmental Sciences
Deakin University, 221 Burwood Highway
Burwood, Victoria 3125

One hundred Years Ago

ICHNEUMON MAIMED BY SAW-FLY. - During the end of April and beginning of May I had under observation a saw-fly, *Perga lewisii*, Westw., guarding its larvae on a branch of *Eucalyptus amygdalina*. On the 6th of May I noticed an ichneumon amongst the larvae, while the saw-fly was on the leaf, apparently contentedly watching. Mr. Edmund Jarvis and myself examined the ichneumon, and found that its antennae and ovipositor were missing. While it was under the influence of a dose of cyanide of potassium Mr. Jarvis noticed it eject some eggs through the remaining stump of the ovipositor. The incident is interesting, as it is probably the first case recorded of this species of *Perga* having rendered the parasite harmless. In the accompanying exhibit the ichneumon minus its antennae and ovipositor is shown; the eggs can hardly be seen, as they have shrivelled, but an enlarged drawing is shown. - J.P. M'LENNAN. Emerald, Victoria, 8/6/07.

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